



September 29, 2017

Mr. Anthony Krone  
Risk Manager  
Shelby County Schools  
160 South Hollywood – Room 152  
Memphis, Tennessee 38112

**RE: Lead in Drinking Water Post-Flush Sampling  
Oakhaven Middle & High School  
3125 Ladbroke Road  
Memphis, Tennessee  
Tioga Project No.: 24816.02**

Dear Mr. Krone,

At the request of Shelby County Schools (the Client), Tioga Environmental Consultants (Tioga) performed sampling of drinking water sources at Oakhaven Middle & High School for laboratory analysis of total lead concentrations.

As first-draw sampling of drinking water sources at this school on September 12<sup>th</sup>, 2017 revealed the potential for elevated lead levels in the potable water system, Tioga recommended additional sampling of all water fountains in the school to determine the extent of the issue. Following the receipt of the laboratory analytical results from the initial sampling event, Tioga informed Shelby County Schools Risk Management personnel, who instructed maintenance personnel to take the water fountains at this school out of service pending further testing. Prior to this post-flush sampling event, the water fountains throughout the school had been shut off for multiple weeks.

Initial flush sampling of refrigerated water fountains identified during the previous first-draw sampling as having elevated lead levels in the drinking water was conducted on the evening of September 25<sup>th</sup>, 2017. Prior to sample collection, these refrigerated water fountains were flushed for 15 minutes in order to completely drain the internal holding tanks and obtain samples of water from the lines feeding the fountains.

On September 26<sup>th</sup>, 2017, all non-refrigerated water sources identified during the first draw sampling event were sampled to obtain samples from the lines feeding the fountains. Additionally, first draw samples were collected from the refrigerated water fountains sampled the night before, to evaluate the water that was stored in the unit overnight. Sampling was conducted early in the morning, before any potable water sources had been used for the day and prior to the arrival of any students or faculty. Maintenance personnel reactivated the water fountains prior to sampling, and the fountains were flushed for 30 seconds before sample collection, and the water fountains were deactivated and taken out of service immediately.

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following the sampling. One additional sample was also collected from the supply at the point of entry to the building. This line was also flushed for 30 seconds prior to sample collection.

The EPA has established an action level for public water supply systems at 15 micrograms of lead per liter of water (15 µg/L). Further, EPA recommends that schools remove water fountains and other outlets used for consumption if lead levels exceed 20 µg/L. Though this school uses water from the municipal water supply and therefore does not qualify as a public water supply system, Tioga recommends that the more conservative EPA action level of 15 µg/L be used in the decision making process as to the continued operation of the potable water sources at the school.

**Results Based on Laboratory Analysis:**

Table 1 on the following page summarizes the sampling locations, laboratory analytical results, and EPA action level for lead in drinking water. Sample results with a "<" symbol did not contain lead content above the laboratory detection limit. Samples highlighted in yellow exceeded the EPA action level for lead. A dash indicates that a sample was not collected. This table includes results from both the first draw sampling performed on September 12, 2017 and the follow-up flush sampling performed on September 25 and 26.

**Table 1**  
**Summary of Analytical Results - Oakhaven Middle & High School**

Sample ID	Sample Location	First Draw Sampling Lead (9/12/2017) (µg/L)	Post 15-Minute Flush Sampling Lead (µg/L)	Post 30-Second Flush Sampling Lead (µg/L)	EPA Action Level (µg/L)
31-1	High School – Water Fountain Across from Room 219	5550	-	29.1	15
31-2	Middle School – Water Fountain Across from Room 223	47.6	-	2.93	
31-3	Middle School – Water Fountain Near Room 224	26.1	-	1.44	
31-4	High School – Water Fountain Across from Room 218	89.0	-	7.45	
31-5	High School – Water Fountain Across from Room 214	2290	-	18.7	
31-6	High School – Water Fountain Across from Room 212	822	-	27.6	
31-7	High School – Water Fountain Near Room 210	13.6	-	-	
31-8	High School – Water Fountain Across from Room 208	1.75	-	-	
31-9	High School – Water Fountain Across from Room 113	1270	-	13.1	
31-10	High School – Water Fountain Across from Room 120	18.1	-	0.678	
31-11	Middle School – Water Fountain Across from Room 126	364	-	6.80	
31-12	Middle School – Water Fountain Near Room 121	1.05	-	-	
31-13	Cafeteria Water Fountain	86.8	<0.500	<0.500*	
31-14	Vocational / Band Water Fountain	57.2	0.793	<0.500*	
31-15	ROTC Water Fountain	8.98	-	-	
31-16	High School – Gym Water Fountain	6.87	-	-	
31-17	Water Fountain in Football Locker Room	<0.513	-	-	
31-18	Middle School – Gym Water Fountain	1.59	-	-	
31-19	High School – Auditorium Double Water Fountain	7.29	-	-	
31-20	High School – Auditorium Single Water Fountain	592	Removed from Service		
31-21	Elementary – Water Fountain Near Room 101 (Bubbler)	58.1	-	<0.500	
31-22	Elementary – Tall Water Fountain Near Room 101	0.558	-	-	
31-23	Elementary – Water Fountain Near Room 203 (Bubbler)	0.859	-	-	
31-24	Elementary – Cafeteria Water Fountain	0.909	-	-	
31-SL	Supply Line at Building Entry	-	-	1.54	

\* These samples were collected as a first draw on refrigerated water fountains

A review of the laboratory analytical results of the water samples collected during the post-flush sampling revealed three samples with total lead concentrations above the EPA action level for drinking water. The sample collected from the supply line at the point of entry to the building was below the EPA action level for lead.

### **Recommendations:**

Based upon the laboratory analytical results of the potable water samples collected from Oakhaven Middle & High School, Tioga recommends that the three water sources identified in the table above that exceeded the EPA action level during the Post 30-Second Flush Sampling event be removed from service and the associated water supply line capped, as post-flush sampling results indicate a source of lead contamination in the **immediate** water supply system for these fountains. Any water fountain built or installed before 1988 has a greater potential for containing lead piping, lead based parts and materials, and/or lead based solder. Particular care in the flushing, monitoring, and maintenance of these water fountains should be taken due to the lack of regulation concerning lead containing materials used during water fountain construction, installation, and maintenance.

The EPA provides technical guidance for reducing lead in drinking water in schools published in the October 2006 revision of the "3Ts for Reducing Lead in Drinking Water in Schools". Tioga recommends that a plan be developed and implemented in accordance with this guidance for flushing of potable water sources not subject to removal with elevated lead levels in first-draw samples, especially following extended periods of non-use such as weekends, holidays, and breaks.

### **Limitations**

Potable water sources with elevated lead levels may potentially be present in areas of the property that are not addressed with this report. This investigation only included the potable water sources specifically addressed.

We appreciate the opportunity to provide you with this service. Should you have any questions regarding this report, please contact me at (901) 791-2432.

Sincerely,

**TIOGA ENVIRONMENTAL CONSULTANTS, INC.**



Margaret F. Strom, QEP, CHMM  
President

**Enclosure: (1) Laboratory Analytical Report**

9/28/2017

Tioga Environmental Consultants  
Mr. Eric Davis  
357 North Main Street  
Memphis, TN, 38103

Ref: Analytical Testing  
Lab Report Number: 17-269-0296  
Client Project Description: 31 - Flush  
Memphis, TN  
Project #24816.02

Dear Mr. Eric Davis:

Waypoint Analytical, Inc. received sample(s) on 9/26/2017 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in accordance with the applicable analytical method.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, method validations, instrumentation maintenance and calibration for all parameters (NELAP and non-NELAP) were performed in accordance with guidelines established by the USEPA (including 40 CFR 136 Method Update Rule May 2012) and NELAC unless otherwise indicated. Any parameter for which the laboratory is not officially NELAP accredited is indicated by a '~' symbol. These are not included in the scope because NELAP accreditation is either not available or has not been applied for. Additional certifications may be held/are available for parameters, where NELAP accreditation is not required or applicable. A full list of certifications is available upon request.

Certain parameters (chlorine, pH, dissolved oxygen, sulfite...) are required to be analyzed within 15 minutes of sampling. Usually, but not always, any field parameter analyzed at the laboratory is outside of this holding time. Refer to sample analysis time for confirmation of holding time compliance.

The results are shown on the attached Report of Analysis(s). Results for solid matrices are reported on an as-received basis unless otherwise indicated. This report shall not be reproduced except in full and relates only to the samples included in this report.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

*Randell H. Thomas*

Randy Thomas  
Project Manager

*Laboratory's liability in any claim relating to analyses performed shall be limited to, at laboratory's option, repeating the analysis in question at laboratory's expense, or the refund of the charges paid for performance of said analysis.*

Alabama #40750	Louisiana #04015	VA NELAP #460181	Texas #T104704180-11-6	Arkansas #88-0650
Mississippi	California #2904	NC #415	Oklahoma #9311	Virginia #00106
Kentucky #90047	Tennessee #TN02027	EPA #TN00012	Kentucky UST #41	



06510

Tioga Environmental Consultants  
Mr. Eric Davis  
357 North Main Street  
Memphis , TN 38103

Project 31 - Flush  
Information : Memphis, TN  
Project #24816.02

Report Date : 9/28/2017

Report Number : **17-269-0296**

## REPORT OF ANALYSIS

Received : 9/26/2017

Lab No : **96810**  
Sample ID : **31-13-F**

Matrix: **Aqueous**  
Sampled: **9/25/2017 17:02**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<0.500	µg/L	0.500	1	09/27/17 20:00	CCR	EPA-200.8

Lab No : **96811**  
Sample ID : **31-14-F**

Matrix: **Aqueous**  
Sampled: **9/25/2017 17:01**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<b>0.793</b>	µg/L	0.500	1	09/27/17 20:01	CCR	EPA-200.8

Lab No : **96812**  
Sample ID : **31-1-F2**

Matrix: **Aqueous**  
Sampled: **9/26/2017 6:20**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<b>29.1</b>	µg/L	0.500	1	09/27/17 20:03	CCR	EPA-200.8

Lab No : **96813**  
Sample ID : **31-2-F2**

Matrix: **Aqueous**  
Sampled: **9/26/2017 6:22**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<b>2.93</b>	µg/L	0.500	1	09/27/17 20:04	CCR	EPA-200.8

### Qualifiers/ Definitions

DF

Dilution Factor

MQL

Method Quantitation Limit

06510

Tioga Environmental Consultants  
Mr. Eric Davis  
357 North Main Street  
Memphis , TN 38103

Project 31 - Flush  
Information : Memphis, TN  
Project #24816.02

Report Date : 9/28/2017

Report Number : **17-269-0296**

## REPORT OF ANALYSIS

Received : 9/26/2017

Lab No : **96814**  
Sample ID : **31-3-F2**

Matrix: **Aqueous**  
Sampled: **9/26/2017 6:23**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<b>1.44</b>	µg/L	0.500	1	09/27/17 20:05	CCR	EPA-200.8

Lab No : **96815**  
Sample ID : **31-4-F2**

Matrix: **Aqueous**  
Sampled: **9/26/2017 6:15**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<b>7.45</b>	µg/L	0.500	1	09/27/17 20:06	CCR	EPA-200.8

Lab No : **96816**  
Sample ID : **31-5-F2**

Matrix: **Aqueous**  
Sampled: **9/26/2017 6:05**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<b>18.7</b>	µg/L	0.500	1	09/27/17 20:08	CCR	EPA-200.8

Lab No : **96817**  
Sample ID : **31-6-F2**

Matrix: **Aqueous**  
Sampled: **9/26/2017 6:10**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<b>27.6</b>	µg/L	0.500	1	09/27/17 20:13	CCR	EPA-200.8

### Qualifiers/ Definitions

DF

Dilution Factor

MQL

Method Quantitation Limit

06510

Tioga Environmental Consultants  
Mr. Eric Davis  
357 North Main Street  
Memphis , TN 38103

Project 31 - Flush  
Information : Memphis, TN  
Project #24816.02

Report Date : 9/28/2017

Report Number : **17-269-0296**

## REPORT OF ANALYSIS

Received : 9/26/2017

Lab No : **96818**  
Sample ID : **31-9-F2**

Matrix: **Aqueous**  
Sampled: **9/26/2017 6:00**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<b>13.1</b>	µg/L	0.500	1	09/27/17 20:14	CCR	EPA-200.8

Lab No : **96819**  
Sample ID : **31-10-F2**

Matrix: **Aqueous**  
Sampled: **9/26/2017 5:57**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<b>0.678</b>	µg/L	0.500	1	09/27/17 20:15	CCR	EPA-200.8

Lab No : **96820**  
Sample ID : **31-11-F2**

Matrix: **Aqueous**  
Sampled: **9/26/2017 5:49**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<b>6.80</b>	µg/L	0.500	1	09/27/17 20:17	CCR	EPA-200.8

Lab No : **96821**  
Sample ID : **31-13-F2**

Matrix: **Aqueous**  
Sampled: **9/26/2017 5:40**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<0.500	µg/L	0.500	1	09/27/17 20:18	CCR	EPA-200.8

### Qualifiers/ Definitions

DF

Dilution Factor

MQL

Method Quantitation Limit



06510

Tioga Environmental Consultants

Mr. Eric Davis

357 North Main Street

Memphis , TN 38103

Project 31 - Flush

Information : Memphis, TN

Project #24816.02

Report Date : 9/28/2017

Report Number : **17-269-0296**

## REPORT OF ANALYSIS

Received : 9/26/2017

Lab No : **96822**

Sample ID : **31-14-F2**

Matrix: **Aqueous**

Sampled: **9/26/2017 5:44**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<0.500	µg/L	0.500	1	09/27/17 20:19	CCR	EPA-200.8

Lab No : **96823**

Sample ID : **31-21-F2**

Matrix: **Aqueous**

Sampled: **9/26/2017 6:48**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<0.500	µg/L	0.500	1	09/27/17 20:21	CCR	EPA-200.8

Lab No : **96824**

Sample ID : **31-SL**

Matrix: **Aqueous**

Sampled: **9/26/2017 5:37**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Total Lead	<b>1.54</b>	µg/L	0.500	1	09/27/17 20:22	CCR	EPA-200.8

### Qualifiers/ Definitions

DF

Dilution Factor

MQL

Method Quantitation Limit

## Cooler Receipt Form

Customer Number: **06510**

Customer Name: **Tioga Environmental Consultants**

Report Number: **17-269-0296**

### Shipping Method

☐ Fed Ex      ☐ US Postal      ☐ Lab      ☐ Other :   
☐ UPS      ☒ Client      ☐ Courier      Thermometer ID:

Shipping container/cooler uncompromised?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
Number of coolers received	<input type="text" value="1"/>		
Custody seals intact on shipping container/cooler?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> Not Required
Custody seals intact on sample bottles?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> Not Required
Chain of Custody (COC) present?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
COC agrees with sample label(s)?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
COC properly completed	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
Samples in proper containers?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
Sample containers intact?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
Sufficient sample volume for indicated test(s)?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
All samples received within holding time?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
Cooler temperature in compliance?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
Cooler/Samples arrived at the laboratory on ice. Samples were considered acceptable as cooling process had begun.	<input type="radio"/> Yes	<input checked="" type="radio"/> No	
Water - Sample containers properly preserved	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
Water - VOA vials free of headspace	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Trip Blanks received with VOAs	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Soil VOA method 5035 – compliance criteria met	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
<input type="checkbox"/> High concentration container (48 hr)	<input type="checkbox"/> Low concentration EnCore samplers (48 hr)		
<input type="checkbox"/> High concentration pre-weighed (methanol -14 d)	<input type="checkbox"/> Low conc pre-weighed vials (Sod Bis -14 d)		
Special precautions or instructions included?	<input type="radio"/> Yes	<input checked="" type="radio"/> No	

Comments:

Signature:

Date & Time:

For Laboratory Use Only

Client Name/Address <b>Tioga Environmental</b>		Client Project Manager/Contact <b>Eric Davis</b>		Billing Information <b>Tioga</b>		For Laboratory Use Only			
Project Description <b>31-Flush</b>		Project/Site Location (City/State) <b>Memphis TN</b>		<input checked="" type="checkbox"/> RUSH - Additional charges apply <input type="checkbox"/> Special Detection Limit(s) Date Results Needed		Method of Shipment <input type="checkbox"/> Fed Ex <input type="checkbox"/> UPS <input type="checkbox"/> USPS <input checked="" type="checkbox"/> Courier <input type="checkbox"/> Client Drop Off Other		Matrix Key WW - Wastewater GW - Groundwater DW - Drinking Water S - Soil /Solid O - Oil P - Product M - Misc	
Project Number <b>24816.02</b>		Project Manager Phone # <b>(901) 791-2432</b>		Project Manager Email <b>edavis@tiogaenv.com</b>		Purchase Order Number		Site/Facility ID # <b>31 Flush</b>	
<b>Waypoint</b> ANALYTICAL 2790 Whitten Road Memphis, TN 38133 (901) 213-2400		Number of Containers		Matrix (Refer to Key)		(g)rab or (C)omposite		Cool < 10C Na2S2O3 (Micro Only) Cool <= 6C	
Date		Time		Sample Identification		Required Analysis / Preserva		Barcode 17-269-0296 06510 09-26-2017 14:47:35 Tioga Environmental Consultants 31 - Flush	
09/15/17		17:02		31-13-F		1 DW G		X	
09/15/17		17:01		31-14-F		1 DW G		X	
9/26/17		6:20		31-1-F2		1 DW G		X	
↓		6:22		31-2-F2		1 DW G		X	
↓		6:23		31-3-F2		1 DW G		X	
↓		6:15		31-4-F2		1 DW G		X	
↓		6:05		31-5-F2		1 DW G		X	
↓		6:10		31-6-F2		1 DW G		X	
↓		6:00		31-9-F2		1 DW G		X	
↓		5:57		31-10-F2		1 DW G		X	
Ice		Custody Seals		Lab Comments		For Laboratory Use Only		Client Remarks/Comments	
Y/N		Y/N		NA		Sampled by (Name - Print) <b>FELIPE VAZQUEZ</b>		Rush 24-hr TAT	
Blank/Cooler Temp		NA		Relinquished by: (SIGNATURE) <i>[Signature]</i>		Relinquished by: (SIGNATURE) <i>[Signature]</i>		Received by: (SIGNATURE) <i>[Signature]</i>	
				Date Time 9/26/17 11:32		Date Time 9/26/17 11:32		Date Time 9/26/17 11:32	
				Date Time 9/26/17 12:31		Date Time 9/26/17 12:31		Date Time 9/26/17 12:31	
				Date Time 9/26/17 12:39		Date Time 9/26/17 12:39		Date Time 9/26/17 12:39	



Kit ID:	0000085992
Initiated By:	Andy Parrish
Initiated Date:	9/8/2017
Project Comment	

## CHAIN-OF-CUSTO



Company Name Tioga Environmental Consultants		Company Number 06510		Client Project Manager/Contact <i>Eric Davis</i> Mr. Luke Hall		Purchase Order Number	
Site Name <i>31-Flush</i>		Project Number <i>24816.02</i>		<input checked="" type="checkbox"/> RUSH – Additional charges apply <input type="checkbox"/> Special Detection Limits(s) Date Results Needed		Method of Shipment <input type="checkbox"/> Fed Ex <input type="checkbox"/> UPS <input type="checkbox"/> USPS <input type="checkbox"/> Courier <input type="checkbox"/> Client Drop Off Other	
LIMS Project ID		Project Manager Phone # (901) 791-2432		Project Manager Email <i>edavis@tiogaenv.com</i> <del>thall@tiogaenv.com</del>		Site/Facility ID # <i>31-Flush</i>	

  

Date	Time	Sample ID	Matrix	Grab/Comp	# of Cont	Container Type	Preservation	Analyses
<i>9/26/17</i>	<i>5:49</i>	<i>31-11-F2</i>	Aqueous	<i>G</i>	1	Plastic - Pint	NONE	Total Lead/DW
	<i>5:40</i>	<i>31-13-F2</i>	Aqueous	<i>G</i>	1	Plastic - Pint	NONE	Total Lead/DW
	<i>5:44</i>	<i>31-14-F2</i>	Aqueous	<i>G</i>	1	Plastic - Pint	NONE	Total Lead/DW
	<i>6:48</i>	<i>31-21-F2</i>	Aqueous	<i>G</i>	1	Plastic - Pint	NONE	Total Lead/DW
	<i>5:37</i>	<i>31-SL</i>	Aqueous	<i>G</i>	1	Plastic - Pint	NONE	Total Lead/DW
			Aqueous		1	Plastic - Pint	NONE	Total Lead/DW

For Laboratory Use Only			Sampled by (Name - Print)		Client Remarks/Comments				
Ice	Custody Seals	Lab Comments	<i>Margaret Strom</i>		<i>Rush 24-hr TAT</i>				
Y/N	Y/N		Relinquished by: (SIGNATURE)		Date	Time	Received by: (SIGNATURE)	Date	Time
			<i>Margaret Strom</i>		<i>9/26/17</i>	<i>11:15</i>	<i>Philip Strom</i>	<i>9/26/17</i>	<i>11:15</i>
Blank/Cooler Temp			Relinquished by: (SIGNATURE)		Date	Time	Received by: (SIGNATURE)	Date	Time
<i>NA</i>		<i>Philip Strom</i>		<i>9/26/17</i>	<i>12:39</i>	<i>C. Dunez</i>	<i>9/26/17</i>	<i>12:39</i>	